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National Radio Quiet and Dynamic Zones

By Thomas Kidd - April-June 2018

Across the United States, radio transmitters and receivers are protected from interfering with each other through standardized rules overseen by the Federal Communications Commission (FCC) and the National Telecommunications and Information Administration (NTIA). Under normal circumstances, with normal radio transmitters and receivers, this method of protection works quite well. However, some radio transmitters and receivers are far from normal.

Some radio receivers are incredibly sensitive. For example, radio telescopes can receive faint signals from billions upon billions of miles in space. For special receivers there are special areas set aside to protect them from "normal" radio transmitters. The National Radio Quiet Zone (NRQZ) is an area where special rules have been established to protect these special receivers from normal radio transmitters. Signals from normal transmitters like cell phones, television broadcasts, and even microwave ovens, are restricted or prohibited within the National Radio Quiet Zone. These special rules have been established by NTIA to protect the special receivers inside the zone from normal transmitters outside the zone.

Radio transmissions are heavily restricted within the NRQZ by law to facilitate scientific research and military intelligence. The first NRQZ was located in a remote corner of West Virginia; others are in Virginia and a tiny part of Maryland. More are planned in similarly remote locations.

While a quiet zone protects special receivers inside the zone from normal transmitters outside the zone, a dynamic zone does the exact opposite. A National Radio Dynamic Zone would protect normal receivers outside the zone from special transmitters inside the zone. Special transmitters include directed energy systems, high power microwave transmitters, and experimental systems pushing the boundaries of radio technology. Much like quiet zone rules determine what power levels may cross into the zone, dynamic zone rules determine what power levels may escape from the zone.

The United States does not currently have a National Radio Dynamic Zone. However, when authorized, a special transmitter that would typically function in a dynamic zone may be granted authority to operate on a case-by-case basis, typically during limited times and under stringent restrictions to protect normal radios in the area.

Despite the appearance of performing completely opposite functions, the management of quiet and dynamic zones is very similar, as each manages the strength of a radio signal as it crosses each zone's boundary. And, since both require measuring or calculating the signal strength at the boundary, the hardware and software, like the management principles, are nearly identical.

Quiet and dynamic zones are needed because coordinating every conceivable radio frequency protection scenario would be impossible. Imposing transmitter and receiver restrictions on a case-by-case basis would also be impossible, as would policing interference between normal and special radio systems. And, if not impossible, these scenarios would be prohibitively expensive.

There have been encouraging conversations within the United States recently about establishing a National Radio Dynamic Zone along with additional National Radio Quiet Zones. The Department of the Navy will continue to work with the National Science Foundation, the Federal Communications

Commission, and the National Telecommunications and Information Administration to make these special zones a reality.

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